USER MANUAL

TECHLINE®
IMPROVING FLEXIBILITY

ACTUATOR LA12

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Preface

We are delighted that you have chosen a product from LINAK. LINAK systems are high-tech products based on many years of experience in the manufacture and development of actuators, electronic control boxes, controls, and chargers. We are also constantly improving our products to meet customer requirements.

This user manual will tell you how to install, use, and maintain your LINAK LA12 actuator.

We are sure that the LA12 actuator will give you a problemfree operation. Before our products leave the factory they undergo full function and quality testing. Should you nevertheless experience problems with your LINAK products, you are always welcome to contact our service departments or service centres.

Most LINAK subsidiaries have authorised service centres, which are always ready to help you.

LINAK provides a warranty on all its products. This warranty, however, is subject to correct use in accordance with the specifications, maintenance being done correctly and any repairs being carried out at a service centre, which is authorised to repair LINAK products.

LINAK A/S

Safety instructions

Please read the following safety information carefully.

Ensure that all staff who are to connect, mount, or use the actuator are in possession of the necessary information and that they have access to this user manual.

Persons who do not have the necessary experience or knowledge of the product/products must not use the product/products. Besides, persons with reduced physical or mental abilities must not use the product/products, unless they are under surveillance or they have been thoroughly instructed in the use of the apparatus by a person who is responsible for the safety of these persons.

Moreover, children must be under surveillance to ensure that they do not play with the product.

Before you start mounting/dismounting, ensure that the following points are observed:
- The actuator is not in operation.
- The actuator is free from loads that could be released during this work.

Before you put the actuator into operation, check the following:
- The actuator is correctly mounted as indicated in the relevant user instructions.
- The equipment can be freely moved over the actuator's whole working area.
- The actuator is connected to a mains electricity supply/transformer with the correct voltage and which is dimensioned and adapted to the actuator in question.
- Ensure that the voltage applied matches to the voltage specified on the actuator label.
- Ensure that the connection bolts can withstand the wear.
- Ensure that the connection bolts are secured safely.

During operation
- Listen for unusual sounds and watch out for uneven running. Stop the actuator immediately if anything unusual is observed.
- Do not sideload the actuator.
- Use only the actuator within the specified working limits.
- Do not step or kick on the actuator.

When the equipment is not in use
- Switch off the mains supply in order to prevent unintentional operation.
- Check the actuator and joints regularly for extraordinary wear.

Important information

Information about the actuators is described under the following two headings:

Warning!
Failing to follow these instructions can cause accidents resulting in serious personal injury.

Recommendation
Failing to follow these instructions can result in the actuator suffering damage or being ruined.

Warnings

- Do not sideload the actuator.
- Only use the actuator within specified working limits.
- When mounting the LA12 in the application ensure that the bolts can withstand the wear and that they are secured safely.

Recommendations

- Do not place load on the actuator housing and do prevent impact or blows, or any other form of stress to the housing.
- Ensure that the duty cycle and the usage temperatures for LA12 actuators are respected.
- Ensure that the cable cannot be squeezed, pulled or subjected to any other stress.
- Furthermore, it will be good practice to ensure that the actuator is fully retracted in the "normal" position. The reason is that there will be a vacuum inside the actuator if it is extended which over time can lead to water entering the actuator.
- If the actuator is mounted in an application where a mechanical stop prevents the endstop switches in the actuator from being activated, the actuator must be equipped with an electrical safety device (current monitoring) or external limit switch.

CE

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DECLARATION OF CONFORMITY

LINAK A/S
Smedevænget 8
DK - 6430 Nordborg

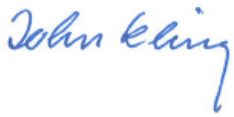
hereby declares that

Actuator LA12

complies with the EMC Directive: 2004/108/EC according to following harmonized standards: EN61000-4-2:2009, EN61000-4-3:2006+A1, EN61000-4-4:2004, EN61000-4-5:2006, EN61000-4-6:2009, EN61000-4-8:2010, EN55016-2-1:2009

Additional information:
The device does also comply with the standard:
ISO 7637-2:2004. Road vehicles -- Electrical disturbances from conduction and coupling -- Part 2: Electrical transient conduction along supply lines only
ISO 10605:2008, Road vehicles -- Test methods for electrical disturbances from electrostatic discharge
CISPR 25:2008, Radio disturbance characteristics for the protection of receivers used on board vehicles, boats, and on devices – Limits and methods of measurement

Nordborg, 2013-02-12



LINAK A/S
John Kling, B.Sc.E.E.
Certification and Regulatory Affairs
Authorized to compile the relevant technical documentation

Original declaration

Misc. on the TECHLINE® actuator system

Warranty
There is a 18 months' warranty on TECHLINE products against manufacturing faults calculated from the production date of the individual products (see label). LINAK's warranty is only valid in so far as the equipment has been used and maintained correctly and has not been tampered with. Furthermore, the actuator must not be exposed to violent treatment. In the event of this, the warranty will be ineffective/invalid. For further details, please see standard terms of sale and delivery for LINAK A/S.

Maintenance
- The actuator must be cleaned at regular intervals to remove dust and dirt and inspected for mechanical damages or wear.
- Inspect attachment points, wires, piston rod, cabinet, and plug, as well as check that the actuator functions correctly.
- The actuator is a closed unit and requires no internal maintenance.
- The actuator is not to be opened by unauthorised personnel. In case the actuator is opened, the warranty will be invalid.
- To ensure that the pregreased inner tube remains lubricated, the actuator must only be washed down when the piston rod is fully retracted.

Maintenance of spherical eyes
In order to maintain a proper performance of the spherical eyes and to increase the resistance against hard environmental wear, we strongly recommend that the spherical (ball bearings) eyes mounted on actuators from LINAK are greased with anticorrosive grease or similar.

Warning!
If irregularities are observed, the actuator must be replaced.

Specifications

Motor:	Permanent magnet motor 12VDC or 24VDC
Cable:	18 AWG or 22 AWG PVC cable
Housing:	High-strength plastic housing
Piston rod:	Piston rod in high-strength plastic
Limit switches:	Built-in endstop switches
End play:	2 mm maximum
Weather protection:	IPX1

Usage

- Duty cycle is max. 10% for 2mm pitch, 40% for 4mm pitch and 60% for 6mm pitch at +5 to +40°C ambient temperature
- Ambient temperatures: -20° to +60°C, full performance from +5°C to +40°C
- Typical noise level dB (A) 55-57, measuring method DS/EN ISO 3743-1, actuator not loaded
- To ensure max. self-locking ability of the actuator the motor must be short-circuited when not moving

Mounting guidelines

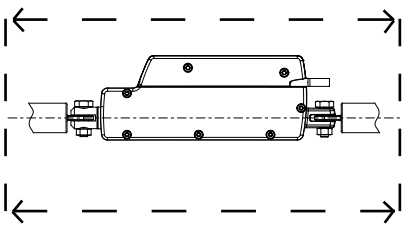
LINAK® linear actuators are quickly and easily mounted by slipping pins through the holes on each end of the units and into brackets on the machine frame and the load.

The mounting pins must be parallel to each other as shown in ***Figure 1***. Pins, which are not parallel to each other, may cause the actuator to bend and be damaged.

The load should act along the stroke axis of the actuator as off-centre loads may cause bending and lead to premature failure. ***See Figure 2.***

Make sure the mounting pins are supported in both ends. Failure to do so could shorten the life of the actuator. Also, avoid applying a skew load on the actuator.

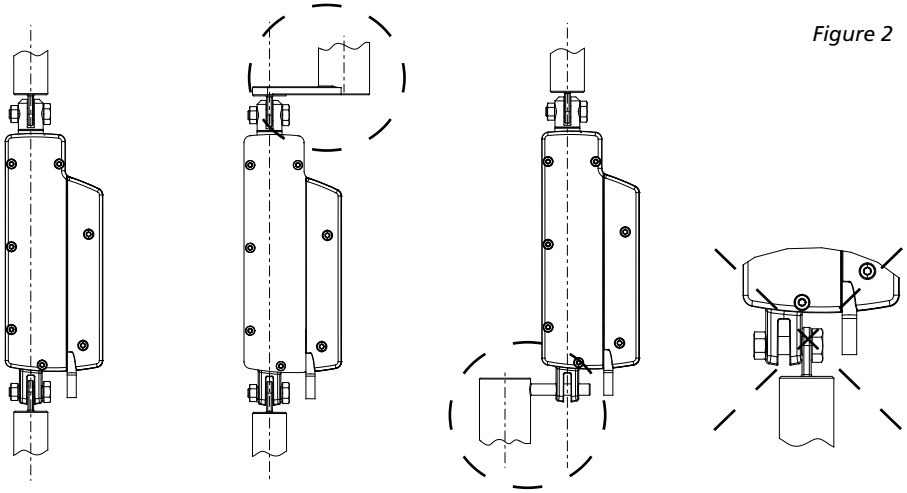
Figure 1



The actuator can rotate around the pivot point in the front and rear end. If this is the case it is of high importance that the actuator is able to move freely over the full stroke length, both during the development and daily operation. Please pay special attention to the area around the housing where parts can be trapped and cause damage to the application and actuator.

In applications with high dynamic forces LINAK recommends not to use the fully extended or retracted position over longer time, as this can damage the end-stop system permanently.

Figure 2



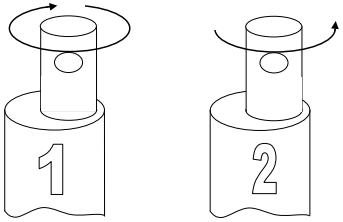
Right **Wrong** **Wrong** **Wrong**

Mounting guidelines

- The mounting pins must have the correct dimension
- The bolts and nuts must be made of a high quality steel grade (e.g. 10.8). No thread on the bolt inside the back fixture or the piston rod eye
- Bolts and nuts must be protected so there is no risk for them to fall out
- Do not use a torque that is too high when mounting the bolts for the back fixture or the piston rod eye. This will stress the fixtures

Please note:
The piston rod eye is only allowed to turn 0-90 degrees.

Instruction concerning the turning of the piston rod eye:
When mounting and taking into use, it is not permitted to make excessive turns of the piston rod eye. In cases where the eye is not positioned correctly, it is permitted to first screw the eye down to its bottom position, at a maximum torque of 2Nm (1), and thereafter a maximum half turn outwards again (2).



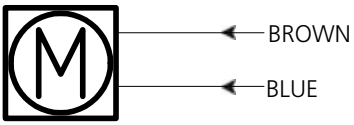
Warning!
If the actuator is used for pull in an application where personal injury can occur, the following is valid:
It is the application manufacturer's responsibility to incorporate a suitable safety arrangement, which will prevent personal injury from occurring, if the actuator should fail

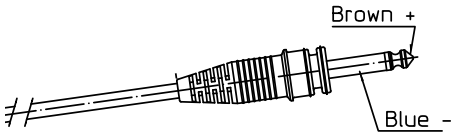
Warning!
LINAK's actuators are not constructed for use within the following fields:
- Offshore installations
- Aeroplanes and other aircraft
- Explosive environments
- Nuclear power generation

Electrical installation
Actuator without feedback

Connection diagram:

Fig. 1 : 12xxxxxxxxxx0/1





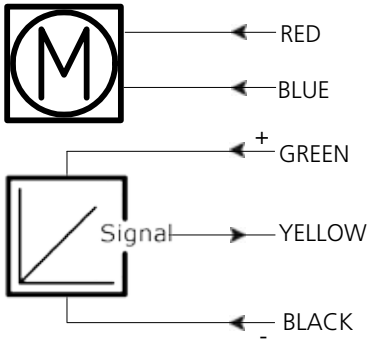
Mono Jack plug

I/O specifications:

Input/Output	Specification	Comments
Description	Permanent magnetic DC motor. See connection diagram, fig. 1 above	
Brown	12 or 24VDC (+/-) 12VDC ± 20% 24VDC ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, 1-5A depending on load 24V, 0.5-2.5A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive

Actuator with absolute positioning - Mechanical potentiometer feedback
Connection diagram:

Fig. 2 : 12xPxxxxxxxxx0

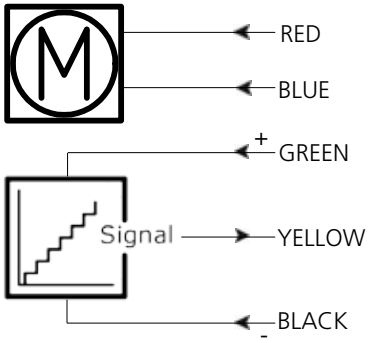


I/O specifications:

Input/Output	Specification	Comments
Description	The actuator can be equipped with a mechanical potentiometer that gives an analogue feedback signal when the actuator moves. See connection diagram, fig. 2 above	
Red	12 or 24VDC (+/-) 12VDC ± 20% 24VDC ± 10% Under normal conditions: 12V, 1-5A depending on load 24V, 0.5-2.5A depending on load	To extend actuator: Connect Red to positive To retract actuator: Connect Red to negative
Blue		To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Green	Signal power supply (+)	+10V or other value
Black	Signal power supply GND (-)	
Yellow	Potentiometer feedback Slide potentiometer, 10 kohm 1 kohm = 0 mm stroke 11 kohm = 100 mm stroke The maximum effect: 0.1W	Linearity: ± 20% Minimum lifetime: 15,000 cycles Average lifetime: 40,000 cycles Max. current output: 1mA

Actuator with absolute positioning - Analogue feedback
Connection diagram:

Fig. 3 : 12xB/Cxxxxxxxxx0

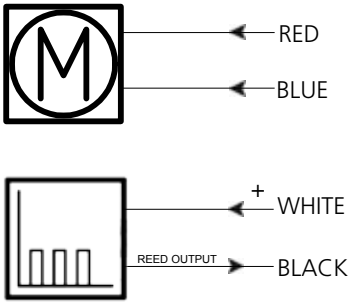


I/O specifications:

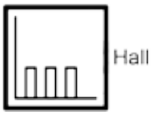
Input/Output	Specification	Comments
Description	The actuator can be equipped with electronic circuit that gives an analogue feedback signal when the actuator moves. See connection diagram, fig. 3 above	
Red	12 or 24VDC (+/-) 12VDC ± 20% 24VDC ± 10%	To extend actuator: Connect Red to positive To retract actuator: Connect Red to negative
Blue	Under normal conditions: 12V, 1-5A depending on load 24V, 0.5-2.5A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Green	Signal power supply (+) 12-24VDC	Current consumption: Max. 60mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Yellow	Analogue feedback 0-10V (Option B) 0.5-4.5V (Option C)	Tolerances +/- 0.2V Max. current output: 1mA Ripple max. 200mV Transaction delay 100ms Linear feedback 0.5% It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning

Actuator with Reed - Relative positioning 4 wires
Connection diagram:

Fig. 4 : 12xE/Mxxxxxxxxx4

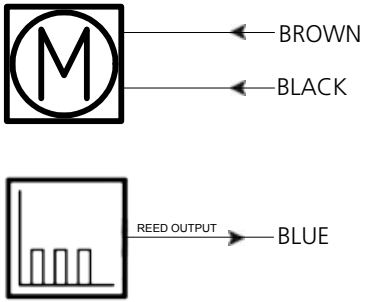


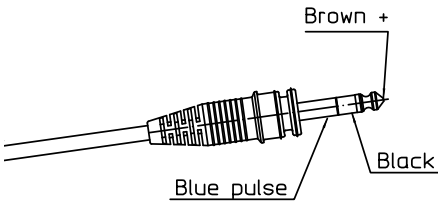
I/O specifications:

Input/Output	Specification	Comments
Description	The actuator can be equipped with a Reed sensor and a spindle magnet that give a relative positioning feedback signal when the actuator moves. The output signal is a PNP signal. See connection diagram, fig. 4 above	
Red	12VDC ± 20% 24VDC ± 10%	To extend actuator: Connect Red to positive To retract actuator: Connect Red to negative
Blue		To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Black	Reed output: same as input voltage 4 pole magnet (Option M) 2mm pitch = 0.5mm per pulse 4mm pitch = 1.0mm per pulse 6mm pitch = 1.5mm per pulse 10 pole magnet (Option E) 2mm pitch = 0.2mm per pulse 4mm pitch = 0.4mm per pulse 6mm pitch = 0.6mm per pulse	Max. switching capacity 750mA
White	Signal power supply (+)	

Actuator with Reed - Relative positioning 3 wires
Connection diagram:

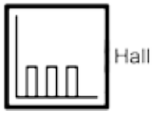
Fig. 5 : 12xRxxxxxxxxx2/3





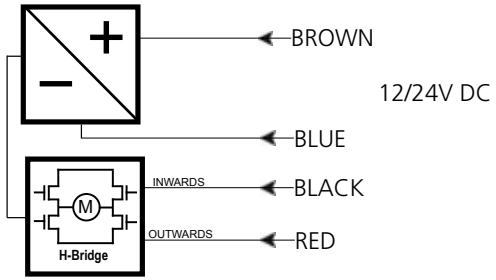
Stereo Jack plug

I/O specifications:

Input/Output	Specification	Comments
Description	The actuator can be equipped with a Reed sensor and a spindle magnet that give a relative positioning feedback signal when the actuator moves. The output signal is a PNP signal. See connection diagram, fig. 5 above	
Brown	12VDC ± 20% 24VDC ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Black		To extend actuator: Connect Black to negative To retract actuator: Connect Black to positive
Blue	Reed output: same as input voltage -1V 4 pole magnet (Option R) 2mm pitch - 0.5mm per pulse 4mm pitch = 1.0mm per pulse 6mm pitch = 1.5mm per pulse	Max. switching capacity 750mA

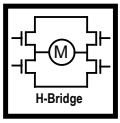
Actuator with IC (no EOS out)
Connection diagram:

Fig. 6 : 12xDxxxxxxxxx8



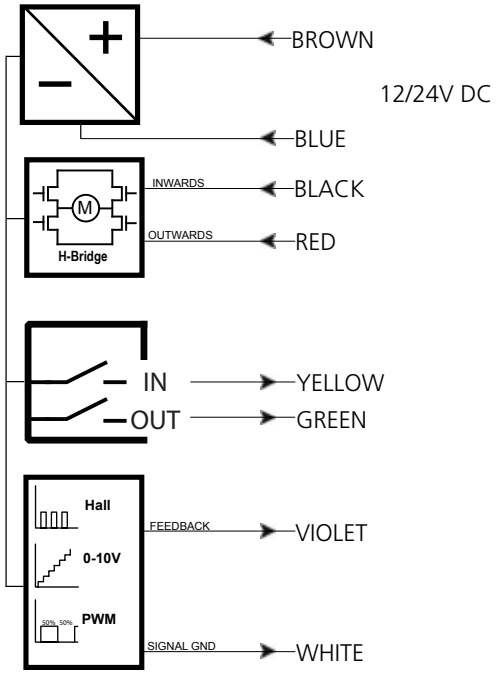
Actuator with IC (no EOS out)

I/O specifications:

Input/Output	Specification	Comments
Description	Easy to use interface with integrated power electronics (H-bridge). The actuator can also be equipped with electronic circuit that gives an absolute or relative feedback signal. The version with "IC option" cannot be operated with PWM (power supply). See connection diagram, fig. 6, page 16	
Brown	12 or 24VDC (VDC) Connect Brown to positive 12VDC ± 20% 24VDC ± 10% Under normal conditions: 12V, 1-5A depending on load 24V, 0.5-2.5A depending on load	Note: Do not change the power supply polarity on the brown and blue wires! Power supply GND (-) is electrically connected to the housing
Blue	12 or 24VDC (GND) Connect Blue to negative 12VDC ± 20% 24VDC ± 10% Under normal conditions: 12V, 1-5A depending on load 24V, 0.5-2.5A depending on load	
Red	Extends the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF Input current: 10mA
Black	Retracts the actuator	
Green	Not to be connected	
Yellow	Not to be connected	
Violet	Not to be connected	
White	Not to be connected	

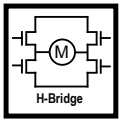
Actuator with IC and endstop signals
Connection diagram:

Fig. 7 : 12xF/K/L/N/S/Txxxxxxxxx8



Actuator with IC and endstop signals

I/O specifications:

Input/Output	Specification	Comments
Description	Easy to use interface with integrated power electronics (H-bridge). The actuator can also be equipped with electronic circuit that gives an absolute or relative feedback signal. The version with "IC option" cannot be operated with PWM (power supply). See connection diagram, fig. 7, page 18	
Brown	12 or 24VDC (VDC) Connect Brown to positive 12VDC ± 20% 24VDC ± 10% Under normal conditions: 12V, 1-5A depending on load 24V, 0.5-2.5A depending on load	Note: Do not change the power supply polarity on the brown and blue wires! Power supply GND (-) is electrically connected to the housing
Blue	12 or 24VDC (GND) Connect Blue to negative 12VDC ± 20% 24VDC ± 10% Under normal conditions: 12V, 1-5A depending on load 24V, 0.5-2.5A depending on load	
Red	Extends the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF Input current: 10mA
Black	Retracts the actuator	
Green	Endstop signal out	Output voltage min. V_{IN} - 1V Source current max. 100mA Endstop signals are NOT potential free
Yellow	Endstop signal in	

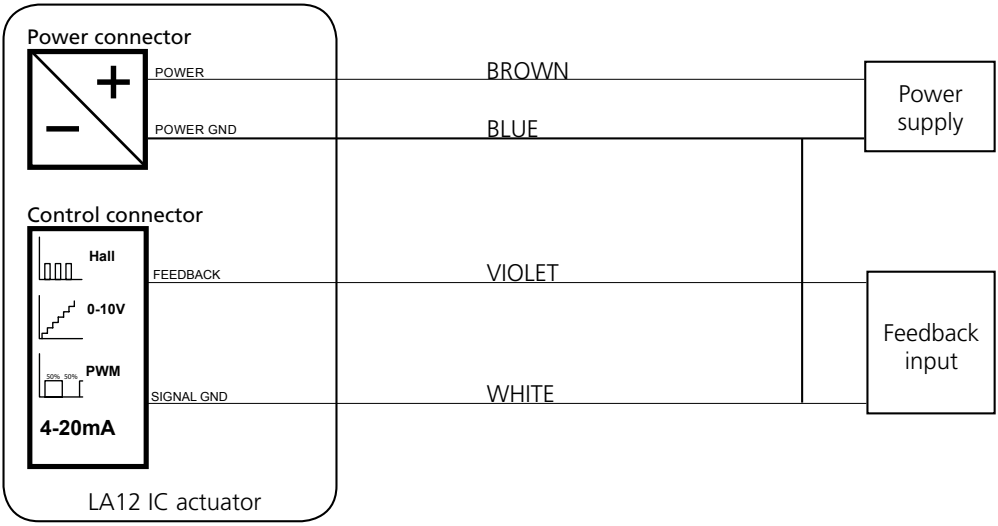
Actuator with IC and endstop signals

I/O specifications:

Input/Output	Specification	Comments
Violet	Mechanical slide potentiometer 0-10V (Option T) Slide potentiometer, 10 kohm 1 kohm = 0 mm stroke 11 kohm = 100 mm stroke The maximum effect: 0.1W	Max. 100mm stroke Linearity: ± 20% Minimum lifetime: 15,000 cycles Average lifetime: 40,000 cycles Max. current output: 1mA
	Analogue feedback 0-10V (Option F) 0.5-4.5V (Option K)	Tolerances +/- 0.2V Max. current output 1mA Ripple max. 200mV Transaction delay 100ms Linear feedback 0.5%
	Hall sensor 2 pulses (Option L) 4 pulses (Option N)	Max. current output 12mA Output = input -1V
	Single Hall (Option S)	Max. current output 12mA Output = input -1V Min. on time 3ms
	None (Option D)	Not available with feedback or endstop out
White	Signal GND: Only for mechanical slide potentiometer and analogue feedback	For correct wiring of power GND and Signal GND see page 21
	Ready signal: Only for single hall and PWM	Max. 10mA

Correct wiring of Power GND and Signal GND for IC

When using the feedback output, it is important to use the right connection setup. Attention should be paid to the two ground connections. Power GND in the Power connector and Signal GND in the Control connector. When using either 0-10V, Hall or PWM feedback, the Signal GND must be used. For optimal accuracy, the Signal GND is connected to the Power GND as close as possible to the feedback input equipment.



Please note that this section only applies for the following feedback options: 0-10V, Hall and PWM.

Test of conducted and radiated emission (EMC)

All TECHLINE actuators have been tested in accordance with EN55011 class B (2007) (CISPR 11). A 1m cable has been used in the test set-up.

Actuator without H-bridge

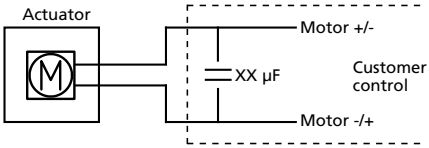
1) For normal operation the following is valid:

- Radiated emission requirements are met.
- Conducted emission requirements are met. However, to meet with these requirements a capacitor has been mounted across the motor wires outside the actuator, and tests have then been made with this capacitor. Capacitor values for some of the TECHLINE actuators can be found in the scheme below.

To comply with EN55011 class B (2007) a capacitor must be added across the motor wires, or the connected control box must have similar/better filtering. The actuator is not delivered with a built in capacitor, because then it would not be possible to PWM the motor for those who would want to do that.

Please view the scheme below for the correct choice of capacitor for the actuator in question.

Product	Capacitor value
LA12	1 µF



2) For systems/operations that use PWM-control it is up to the customer to test and meet the requirements.

Actuator with H-bridge

1) For normal operation with soft start/stop the following is valid:

- The actuator has been tested when operating with constant 80%-PWM.
- Radiated emission requirements are met.
- Conducted emission requirements are met.

2) For systems with LINAK PWM regulation (among other things parallel operation and speed regulation) the following is valid:

- Radiated emission requirements are met.
- Conducted emission requirements are met.

3) Speed regulation:

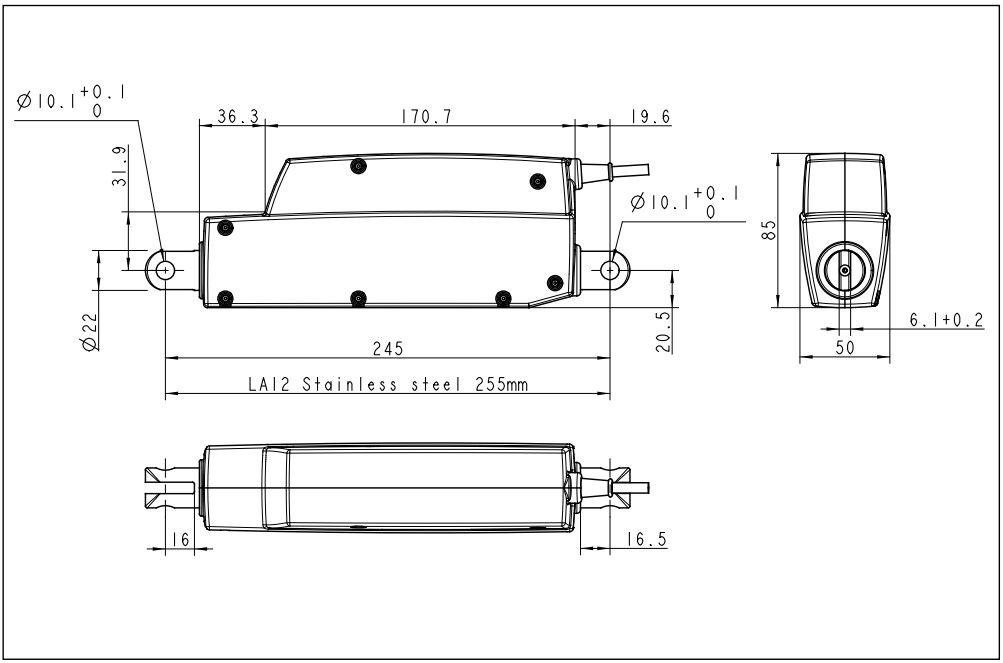
- If the speed is regulated below a nominal speed of 80% (80%-PWM), it is necessary to mount a filter in order to comply with the conducted emission requirements. For systems/operations that are speed regulated, it is up to the customer to test and meet the requirements.

Troubleshooting

Symptom	Possible cause	Action
No motor sound or movement of piston rod	The actuator is not properly connected to the power supply Customer fuse burned Cable damaged **IC:** Wrongly connected: + Brown, - Blue Signal required for moving outwards: + VCC -> RED Wire Signal required for moving inwards: + VCC -> Black Wire	• Check the connection to the power supply or the external control unit (if any) • Check wire connection (Red/ Black) on control unit • Please contact LINAK
Excessive electricity Consumption	Misalignment or overload in application	• Align or reduce load • Try to run the actuator without load • Please contact LINAK
Motor runs but spindle does not move	Gearing system or spindle damaged	• Please contact LINAK
Actuator cannot lift full load	Motor is damaged Insufficient power supply **IC:** Current cut off (overload in application)	• Align or reduce load • Check power supply • Please contact LINAK
No signal from Feedback	Wrongly Connected: Violet: Signal out White: Signal GND Yellow: Endstop In Green: Endstop Out Cable damaged Bad connection Potentiometer damaged Hall sensor or magnet damaged	• Check wiring • Please contact LINAK
Motor runs too slowly or does not run with full force Motor runs in smaller steps	Load is higher than specified Voltage drop in cable (Use of long cables can negatively affect the performance of the actuator) Insufficient power supply **IC:** Current Cut-off	• Reduce load • Check power supply
Actuator(s) cannot hold the chosen load	Load is higher than specified	• Reduce load

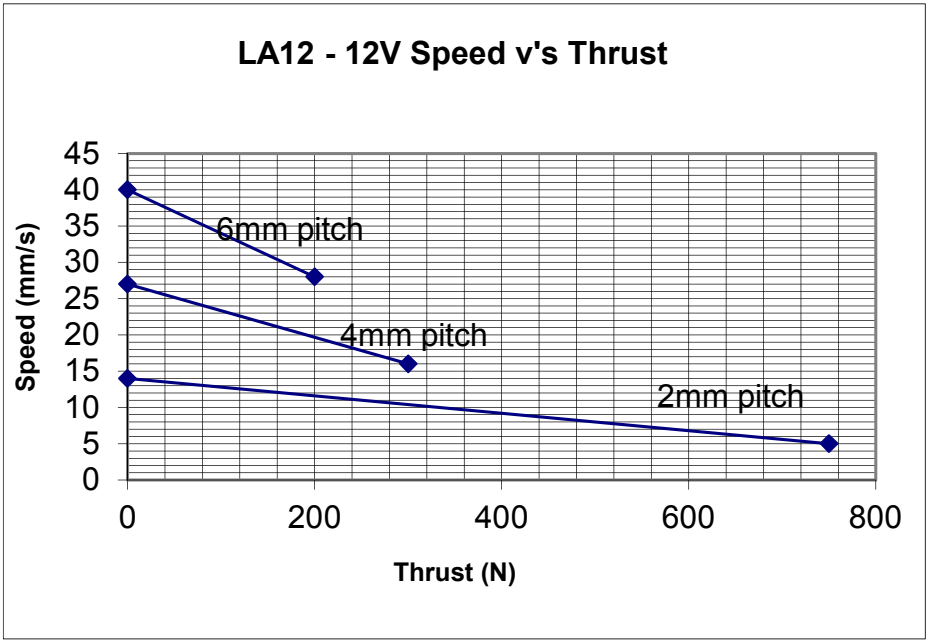
ACTUATOR DIMENSIONS

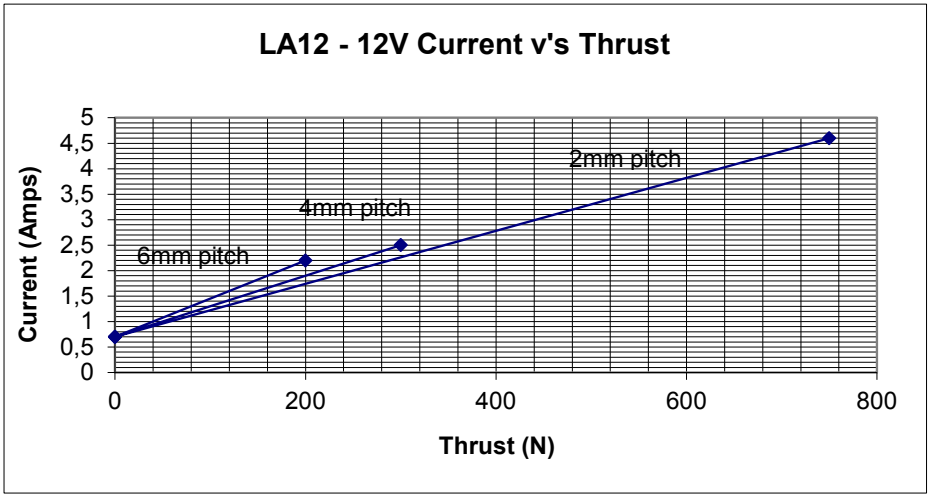
TECHLINE® LA12:



Speed and current curves

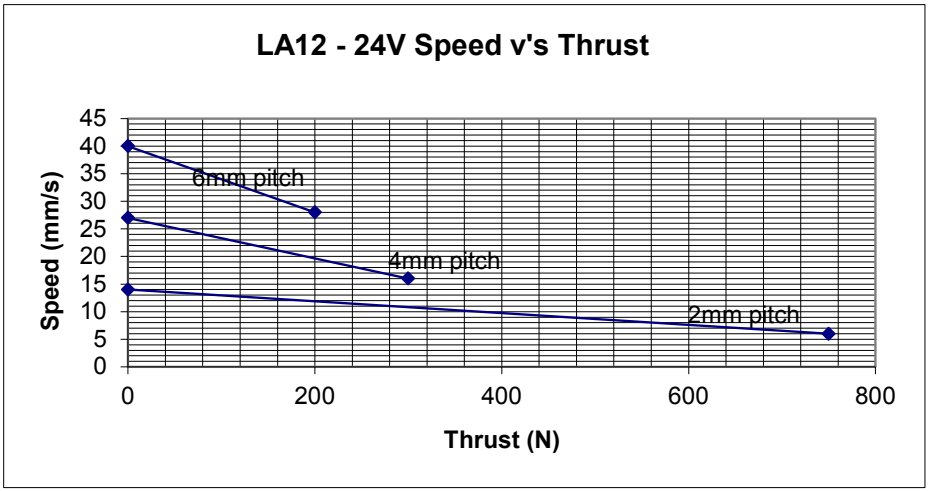
The values below are typical values made with a stable power supply and an ambient temperature of 20˚ C.

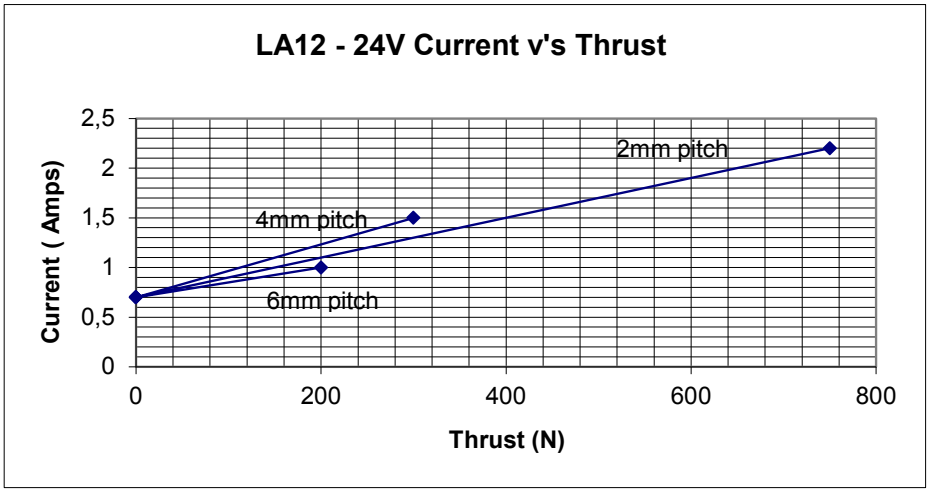




Speed and current curves

The values below are typical values made with a stable power supply and an ambient temperature of 20˚ C.





Repair and spare parts

Repair
Only an authorised LINAK® service centre should repair LINAK actuator systems. Systems to be repaired under warranty must be sent to an authorised LINAK service centre.
In order to avoid the risk of malfunction, all actuator repairs must only be carried out by an authorised LINAK Service shop or repairer, as special tools and parts must be used.
If a system is opened by unauthorised personel there is a risk that it may malfunction at a later date.

Spare parts
LINAK can supply spindle parts and motor parts as spare parts. Please indicate the designation from the label when ordering spare parts from your nearest authorised LINAK dealer.

Main groups of disposal

LINAK's products may be disposed of, possibly by dividing them into different waste groups for recycling or combustion.

Product	Metal scrap	Cable scrap	Electronic scrap	Plastic recycling or combustion
LA12	X	X	X	X

We recommend that our product is disassembled as much as possible at the disposal and that you try to recycle it.

Label for LA12

LINAK®
WE IMPROVE YOUR LIFE
DESIGNED IN DENMARK
Type : 121X0X-3100122X
Item No. : 120300-00
Prod. Date : 2014.06.22 S.O.7654321
Max Load : Push 200 N / Pull 200 N IP69K
Power Rate: 12 V⎓ / Max. 2.5 A
Duty Cycle : Max. 60%
NOT TO BE OPENED BY UNAUTHORIZED PERSONNEL
NE PAS A OUVRIR PAR PERSONNEL NON – AUTORISÉ
P.O.1234567-0001 MADE BY LINAK A/S DENMARK

1. **Type.: 121X0X-3100122X**
   Describes the basic functionality of the product.
2. **Item no.: 120300-00**
   Sales and ordering code
3. **Prod. Date.: YYYY.MM.DD S.O. 7654321**
   Production date describes when the product has been produced. This date is the reference for warranty claims. Sales order references are printed on the invoice
4. **Max Load.: Push 200N / Pull 200N IP69K**
   Describes the maximum load that the product can be exposed to in compression and tension. This line also contains a reference to the product's IP protection degree
5. **Power Rate.: 12VDC / Max. 2.5 Amp**
   Input voltage for the product and maximum current consumption
6. **Duty Cycle.: Max 60%**
   The duty cycle defines the maximum period during operation without interruption. After operation, a pause must be observed. It is important that the operator follows the instructions of the duty cycle; otherwise, a possible overload may result in reduced product life/errors
7. **P.O 1234567-0001**
   The LINAK production order followed by a unique sequential identification number

Key to symbols

The following symbols are used on the LA12 label.

Symbol	Norms	Approvals
	WEEE Directive 2002/96/EC	Wheelie bin
	Compliance to all relevant EC directives	CE
	C-Tick 2002: The Australian EMC	C-Tick
	China Pollution control mark (also indicates recyclability)	China RoHS legislation
	ISO 7000- 0434A: Caution	
	Operating instructions	

LINAK APPLICATION POLICY

The purpose of the application policy is to define areas of responsibilities in relation to applying a LINAK product defined as hardware, software, technical advice, etc. related to an existing or a new customer application.

LINAK products as defined above are applicable for a wide range of applications within Medical, Furniture, Desk, and Industry areas. Yet, LINAK cannot know all the conditions under which LINAK products will be installed, used, and operated, as each individual application is unique.

The suitability and functionality of the LINAK product and its performance under varying conditions (application, vibration, load, humidity, temperature, frequency, etc.) can only be verified by testing, and shall ultimately be the responsibility of the LINAK customer using any LINAK product.

LINAK shall be responsible solely that LINAK products comply with the specifications set out by LINAK and it shall be the responsibility of the LINAK customer to ensure that the specific LINAK product can be used for the application in question.

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